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The role of cGMP-dependent signaling pathway in synaptic vesicle cycle at the frog motor nerve terminals

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Abstract

The role of cGMP-dependent pathways in synaptic vesicle recycling in motor nerve endings during prolonged high-frequency stimulation was studied at frog neuromuscular junctions using electrophysiological and fluorescent methods. An increase of intracellular cGMP concentration (8-Br-cGMP or 8-pCPT-cGMP) significantly reduced the cycle time for synaptic vesicles through the enhancement of vesicular traffic rate from the recycling pool to the readily releasable pool and acceleration of fast endocytosis. Pharmacological inhibition of soluble guanylate cyclase or protein kinase G slowed down the rate of recycling as well as endocytosis of synaptic vesicles. The results suggest that cGMP-PKG-dependent pathway serves a significant function in the control of vesicular cycle in frog motor terminals. Copyright©2008 Society for Neuroscience.

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Keywords

cGMP, End-plate currents, Endocytosis, Exocytosis, FM1-43, Recycling of synaptic vesicles